All writers upon the operative treatment of gangrene refer to the importance of adhesions. Their presence greatly increases the chances of a good result; their absence predisposes to pneumothorax and to the entrance of septic material into the pleura, with resulting empyema. Lenhartz advises that if the condition of the patient does not demand immediate pneumotomy, this operation should be performed in two steps, the lung being fixed to the chest wall at one time, and opened later. When, however, all the signs indicate that procrastination would be dangerous, it is best to open the lung without delay, care being taken to draw the organ into the wound and to stitch it, so as to guard against the occurrence of pneumothorax and empyema.

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ZOMOTHERAPY IN TUBERCULOSIS.

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Some months ago two French scientists, Richet and Hericourt,[1] announced most favorable results in the treatment of tuberculosis with raw meat or its juice. They began two years ago to publish their observations, and during the last year both have written glowing accounts of the efficiency of this treatment. They have long been experimenting upon dogs, endeavoring to find some curative agent for tuberculosis; but all to no avail until they began to feed their dogs exclusively upon raw meat. Their dogs, 129 in number, may be divided into three groups. The first, composed of 30, received no treatment; the second, numbering

58, was treated by different methods, while the third, 41 in number, was fed on raw meat. At first the amount was unlimited, but later they found that 10 to 12 grammes per kilogramme of body weight of the animal was sufficient. The first and second groups lived, on an average, 52 days, while the dogs fed on raw meat lived, on an average, 227 days; in other words, the period of life was very nearly five times longer in the dogs fed with raw meat. From their experiments they conclude that cooked meat in any quantity is inefficacious, that meat deprived of its serum is moderately efficacious, and that muscle serum is as efficacious as raw meat. Raw meat they found also to act prophylactically.

The explanation of the action of the raw meat, although discussed at the Paris Conference in 1900, is still unsettled. Richet at that time attributed the beneficial effects to some body in the meat-juice that prevented the development of tuberculous granulations. According to Maragliano, meat acts as a stimulant, and therefore promotes the formation of an antitoxin in the body. More recently Richet has advanced a "metatrophic antitoxic action." The tuberculized animal, he says, dies by a slow and progressive intoxication of the nervous system. The active elements of the muscle serum preserves the nerve cell from a tuberculous intoxication.

Richet and Roux[2] have obtained favorable results in experimental meningeal tuberculosis in dogs. Twenty dogs were inoculated with tubercle bacilli in the spinal canal between the atlas vertebra and the occiput. Eleven of these were fed on raw meat and three survived, two of which were injected with tuberculin and did not succumb, as did one of the dogs which survived after being fed on cooked meat. Nine dogs were fed on cooked meat, and all died.

Chantemesse,[3] who first looked upon raw meat as a stomachic, has later taken an opposite view on account of his own observations. He injected two dogs with tubercle bacilli. One he fed upon raw meat; the other with cooked meat. The first remained sound and well; the second died.

Salmon[4] divided a number of dogs into three groups. The first, which received raw meat and was then injected, died as quickly as the controls. A second group, injected and then fed on raw meat, gained in weight and lived a fairly long time. In the third group treatment with raw meat was not begun until the disease had advanced considerably, and there was much loss of strength. On these raw meat exerted no influence. This author also calls attention to the fact that a dog which has apparently recovered from tuberculous peritonitis may still show at autopsy numerous fresh nodules in the peritoneum and internal organs and an extending tuberculosis.

Fränkel and Sobernheim[5] have published their results obtained by zomotherapy in tuberculous dogs and rats. Nine dogs and four rats were injected with carefully estimated quantities of an emulsion or tubercle bacilli. Four dogs and two rats, fed on a mixed diet, were used as controls, and the remainder fed on raw meat. The dogs all died in six weeks. These authors suggest that Richet and Hericourt's results may be due to the fact that a non-virulent tubercle bacillus was used in the injections.

The literature on zomotherapy in human tuberculosis is more extensive, but no more conclusive. Duhoureau[6] mentions the case of his son, who, from smaller doses than those given by Hericourt, derived much benefit. Hericourt advises 600 to 700 grammes of raw meat, or the juice of 1000 to 1500 grammes of raw meat, per diem. In a recent article Hericourt[7] has collected statistics in zomotherapy in human tuberculosis. Besides eleven cases treated by himself, he reports twelve cases treated by others. These cases may be tabulated as follows:

TABLE I.

Site of lesion.	Number of cases.	Healed.	Improved.
Lungs	16	15	1
Glands	2	1	1
Skin	1	1	
Spine	1	...	1
Knee	1	...	1
Peritoneum	1	1	
Meninges	1	1	

It is but natural that anyone acquainted with pulmonary tuberculosis should, if the cases have not been selected, regard these uniformly good results somewhat skeptically.

Hericourt quotes, in addition, several favorable reports. Dr. Petit-Clerc[8] mentions three cases in the second stage of pulmonary tuberculosis who recovered under treatment by raw meat and fresh air. Dr. Sarge[9] has seen a case of pulmonary tuberculosis in the third stage recover under zomotherapy. Garnault[10] reports two cases in the second and third stages of pulmonary tuberculosis who apparently recovered under raw meat and intratracheal injections of orthoform. Josias and Roux[11] have followed zomotherapy as treatment in six cases of pulmonary tuberculosis in children, three of whom were in the second stage and did very well, and three in the third stage, who did not do so well. Three cases of meningeal tuberculosis were treated without favorable results.

At present the prevalent opinion is that Richet's method is only a better means of offering nourishment and of enabling a larger quantity of food to be given. The resistance of gouty persons toward tuberculosis is, Weber[12] thinks, probably due partly to the meaty food. He recognizes, however, that due proportions of vegetables and fruits are of great importance. In some cases a fair amount of butchers' meat will stimulate the appetite enormously for all kinds of food, and render digestion more vigorous. Meat albumin, in contradistinction to milk albumin, writes Ross,[13] quickly and readily manifests its better qualities in the early observable improvement in the sufferer, and the benefit so obtained is not so easily undone as in the case of casein albumin. The cause, he thinks, is due to the fact that the adult has more muscle, and so needs more muscle-juice, or the muscle-juice contains more iron. Possibly, he says, the meat-juice contains some antitoxic substance. Browning the meat, he thinks, has little effect upon the real properties of serum.

Myosin albumin returns a maximum of nutrient for a minimum of effort, peptonizes readily, and is promptly absorbed, throwing little or no stress and irritating overaction on the stomach. But Bernheim[14] warns us that the benefit of alimentation is not measured by the quantity of food ingested, but by the quantity digested. The raw-meat treatment of Richet and Hericourt is, in effect, really suralimentation, but suralimentation in such a form that the majority of patients can stand it. "When, under the pretext of recovering the albuminoids, one submits the tuberculous patient to an exclusive meat diet, when one declares the carbohydrates—vegetables, sugar, cereals, etc.—to be secondary, the patient is deprived of an element primordially essential to repair, is given only an insufficient diet of phosphates, has his hyperacidity increased, and in place of increasing the artificial arthritism, which would be of value, a state of affairs is favored which would increase the susceptibility to the bacillus."

On account of the great expense, but few patients can carry out the raw-meat treatment as suggested by Hericourt, who advises that the juice of six pounds of rare beef, free from fat, bone, and cartilage, be taken daily. However, smaller quantities can be used advantageously. Two patients who took the full amount for several months made good recoveries. In one of these the disease was advancing quite rapidly. Many patients have been given beef-juice extracted from meat slightly browned, and it seemed to exert a very beneficial but no specific action.

In reviewing the experimental work done on this subject one is struck, as Fränkel remarks, by its meagreness. Chantemesse, Salmon, and Fränkel are apparently the only observers to repeat Richet's work. Fränkel obtained opposite results, Salmon's results were inconclusive, while Chantemesse, from experiments upon two dogs, upholds Richet. For this reason at the suggestion of Dr. Trudeau, and largely under his guidance, the following experiments were carried out:

The five dogs mentioned in Table I. were each inoculated in the external popliteal vein on July 17, 1901, with 2.5 c.c. of a translucent emulsion of tubercle bacilli. The tubercle bacilli were obtained by Dr. Baldwin from the sputum of a rapidly-advancing case of pulmonary tuberculosis. Hesse's agar was used to isolate the bacilli from the sputum, and after one transplantation to sheep serum tubes of dogs' serum (Prince's, q. v. infra.) were inoculated and the cultures used when eight days old.

Two dogs, King and Queen, were chosen as controls. They were fed on a diet of cooked meat, milk, and scraps from the table, but no raw meat. The remaining dogs received nothing but fresh raw beef. The dogs at once began to show but little desire for raw meat, and but one gained weight. The controls appeared much brighter for some time. The wounds on the legs remained open in all the dogs except Jester and Prince, where subcutaneous abscesses were found.

Jester, an old pug, died sixteen days after inoculation. On autopsy a perforation was found in the first part of the duodenum. A specimen of tænia saginata was found at this point of the bowel and was held to be the cause of the perforation, which led to slight peritonitis and death, probably from shock. Tubercle bacilli were found in the spleen, which was moderately enlarged.

During the fourth week all the dogs began to show signs of disease. Twenty-four days after inoculation Page died. Autopsy revealed general miliary tuberculosis of the lungs, general lymphatic glandular enlargement. Tubercle bacilli were found in the lungs and spleen. King, one of the controls, suddenly became very ill and died on the thirty-second day of the experiment. Miliary tubercles were found scattered throughout the lungs, and at the apices they showed beginning necrosis in the centre. A few hemorrhagic infarcts were found along the anterior borders of both lungs, and one spot of consolidation, size of a filbert, was discovered on posterior of left lower lobe. The spleen was very large and almost diffluent, and a general glandular enlargement was present. Lung, liver, and spleen showed many tubercle bacilli, while a few were found in kidneys, glands, and a cheesy focus in small intestine. The autopsy of Prince, who died on the thirty-fourth day, showed same condition in lungs and spleen, where a few scattered tubercles were seen. Enlarged glands, liver, spleen, and kidneys showed tubercle bacilli. The second control and last dog to die was Queen. The disease in the lungs had advanced further and conglomerate tubercles were found. Both lower lobes were nearly airless. The spleen was not so large as in the preceding dogs, but many miliary, grayish nodules were seen on section. Enlargement of glands was present. Tubercle bacilli were found in all the organs except the heart muscle. The heart's blood contained a few tubercle bacilli, but vast numbers were found in the liver, whose substance presented, on section, a peculiar translucent appearance, with a number of brown points surrounded by a narrow, yellow zone.

From this it is seen that the lungs and spleen bear the brunt of the infection, and that there was no greater difference between the pathological findings in the control and tested animals than among the tested animals.

The average life in the controls was thirty-four and one-half days; in the dogs fed on raw meat, it was thirty-one and one-half days.

TABLE II.

No.	Breed of dog.	Weight in kgr.	Quantity injected.		Injected July 17, 1901.	Food.	Death.	Days after injection.	Autopsy.
			Total c.c.	Per kgr. c.c.					
1 King.	¾ Spaniel.	11	2.5	0.22	Intravenously.	Mixed diet.	Aug. 18, 1901	32	Miliary tuberculosis of lungs; acute spleen tumor; tubercle bacilli from organs.
2 Queen.	Part Collie.	11.8	2.5	0.21	Intravenously.	Mixed diet.	Aug. 23, 1901	37	Miliary tuberculosis of lungs; tubercle bacilli from organs.
3 Page.	Mongrel.	9	2.5	0.27	Intravenously.	Raw beef.	Aug. 15, 1901	29	Miliary tuberculosis of lungs; tubercle bacilli from organs.
4 Prince.	Part hound.	17.3	2.5	0.14	Intravenously.	Raw beef.	Aug. 20, 1901	34	Miliary tuberculosis of lungs and spleen; tubercle bacilli from organs.
5 Jester.	Pug.	15.6	2.5	0.16	Intravenously.	Raw beef.	Aug. 2, 1901	16	Acute peritonitis; perforation duodenum; tænia saginata; tubercle bacilli from organs.

TABLE III.—WEIGHTS EXPRESSED IN PERCENTAGE OF NORMAL WEIGHTS.

Name.	July 17.	July 24.	July 31.	Aug. 7.	Aug. 15.	Aug. 22.	Aug. 29.
King	100	92.4	88	87	87	Dead	
Queen . . .	100	105.6	102	98	92	82	Dead
Page	100	100.6	96	92	78	Dead	
Prince . .	100	95.2	86.6	82	70	Dead	
Jester	100	96.2	86.4	Dead			
Average of controls	100	99	95	93	89.6	82	0
Average of tested	100	97.3	89 7	87	74	0	

Fearing that the tubercle bacilli used had been too virulent and that the dose given was too great, it was decided to repeat the experiment, using the attenuated tubercle bacilli grown by Dr. Trudeau for nine years under the name of R. 1. These tubercle bacilli are much attenuated, and injected subcutaneously in fairly large doses into guinea-pigs kill them only after many months. Accordingly on the 6th of December, 1901, six dogs were injected in the external saphenous vein with 2.5 c.c. of an emulsion of these attenuated bacilli. The dogs were divided into two groups. Four were fed on raw meat and given at the same time some fat and occasionally a little bread and dog biscuit. The two others were fed on a general diet exclusive of raw meat. The dogs, which had been fed well for some time previously, were all in good condition. Of the two chosen for controls, No. 5 was not in the condition of the other dogs, and shortly after the injection had a slight cough which, however, soon cleared up. The dogs 1 to 4 inclusive gained weight for one week. Dogs 5 to 6 lost weight for a week, but then began to gain, and from that time on were in excellent condition and showed no loss of appetite. As seen from Table IV., dogs Nos. 3 and 4 died on the eighteenth and seventeenth days, respectively, after inoculation.

Their relative weights can be seen from the table. Dog No. 3 at first lost weight, but later gained considerable weight, and when he died, on May 4, 1902, 121 days after inoculation, weighed twenty-six pounds.

The last dog of the first group to die was No. 1, three-quarters Collie. This dog steadily gained weight for some months, but in July began to suffer from loss of appetite and refused to eat the raw meat. It was fed to him by hand for a time, and when he refused to eat it at all he was put on a general diet. Under this treatment he seemed to improve for a time, but later refused to eat anything but milk. He died finally on the 17th of August, 1902, 225 days after inoculation.

The two dogs used as controls after losing weight slightly at first began to gain. They never lost their appetite and were fed chiefly on "scraps from the table." Their weight never fell below normal, In August, 1902, both were subjected to the tuberculin test. Dog No. 5 reacted to 25 mgr. of Koch's tuberculin. Dog No. 6 received 25 and then 50 mgr. of Koch's tuberculin, but failed to react. This dog appeared well until about September 23, 1902, when he began to limp on his right fore foot. Two days later, after suffering for a part of one day from considerable dyspnœa, he died quite suddenly. The autopsy revealed a fibrous mass which had perforated (?) the aortic arch at the orifice of the innominate artery. A thrombus was found adherent to the aortic wall at this point.

On October 23, 1902, dog No. 5 died after showing slight signs of illness for several days. The left kidney was much enlarged, and the right kidney was the size of a small peanut and very sclerotic. The condition of the heart was similar to that found in dog No. 6, except that the acute endocarditis had more seriously damaged the aortic valve, which consisted largely of masses of vegetations. The mitral valve was slightly thickened, but not ulcerated.

From these figures it is seen that the test dogs lived on an average 110 days after inoculation and the two controls on an average of 308 days.

From the foregoing experiments on the treatment of experimental tuberculosis by raw meat, the following conclusions may be drawn.

1. That raw meat has no perceptible effect on the duration of experimental tuberculosis in dogs if the bacilli are virulent and a sufficient number injected intravenously.

2. That raw meat has no effect on the prolongation of the duration of experimental tuberculosis in dogs, even if the bacilli are attenuated, provided a reasonable quantity be injected intravenously.

3. That under the same conditions dogs fed on a mixed diet with no raw meat may live a much longer time.

Regarding the use of meat in pulmonary tuberculosis, it may be said:

1. That meat is highly essential in the dietetic treatment.

2. That much meat with a judicious admixture of carbohydrates, fats, etc., is essential to the treatment.

3. That rare meat is better than meat well cooked.

4. That meat-juice is of great value in suralimentation, as myosin albumin is easily digested by most patients—even the dyspeptic, and it affords a "maximum of nutrient for a minimum of effort." (In a few patients meat-juice causes diarrhœá and meteorism.)

5. That meat-juice can be taken when patients can take no other form of meat, *i. e.*, when there exists a marked repugnance to all solids.

6. That the juice from raw meat seems slightly, if at all, more beneficial than the juice from meat slightly browned.

7. That the disadvantages of preparing and preserving raw meat-juice more than offset its advantages. (Patients who object to juice from raw meat will willingly take that from meat browned.)

8. That meat-juice is of value, as it can be administered in the form of jellies, ices, etc.

TABLE IV.

No.	Breed of dog.	Weight in kgr.	Quantity injected.		Injected Dec. 6, 1901.	Food.	Death.	
			Total c.c.	Per kgr. c.c.			Date.	Days after injection.
I.	½ Collie.	19.3	2.5	0.13	Intravenously.	Raw beef.	Aug. 17, 1902	255
II.	½ Spaniel.	13.09	2.5	0.19	Intravenously.	Raw beef.	Dec. 26, 1901	18
III.	Mongrel.	11.14	2.5	0.22	Intravenously.	Raw beef.	May 4, 1902	151
IV.	Fox terrier.	9.09	2.5	0.27	Intravenously.	Raw beef.	Dec. 25, 1902	17
V.	Bull and hound	19.1	2.5	0.13	Intravenously.	Mixed diet.	Oct. 23, 1902	323
VI.	Pug and Scotch.	10.8	2.5	0.23	Intravenously.	Mixed diet.	Sept. 24, 1902	294

TABLE V.—WEIGHTS EXPRESSED IN PERCENTAGE OF NORMAL WEIGHTS.

No.	Dec. 8, 1902	Dec 15. 1902	Dec. 21, 1902	Feb. 10, 1902	May 8, 1902	Sept. 20, 1902		Autopsy.
I.	100	102	109.8	115	116	Died Sept. 17, 1902	——	Tuberculous abdominal glands, tuberculous nephritis and orchitis; endocarditis.
II.	100	103.9	100.2	Died	Dec. 26 1901	......	......	Tuberculosis of lungs, hæmatoma of stomach; pregnant.
III.	100	93	78.3	65	Died 106	May 4, 1902	......	Tuberculous nephritis, tuberculous pulmonitis, hemorrhagic pericarditis (tub.?); endocarditis.
IV.	100	102.8	96.1	Died	Dec. 25, 1901	......	——	Pulmonary tuberculosis; pregnancy; tubercle bacilli in glands, spleen and liver.
V.	100	97	102.5	115	107	107	Died Oct. 23, 1902	Acute tuberculous endocarditis; adherent tumor containing tubercle bacilli ulcerating into aorta.
VI.	100	95	......	......	100.5	100.5	Died Sept. 25, 1902	Thrombus in aorta at orifice of innominate artery overlying erosion of aortic wall; adherent mass on outer wall of aorta; endocarditis (tuberculous?). On teasing no tubercle bacilli were found.

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NOTES FROM THE THROAT DEPARTMENT OF THE PATHOLOGICAL LABORATORY OF THE MANHATTAN EYE AND EAR HOSPITAL.[1]

(*a*) A RAPIDLY RECURRING BLEEDING POLYP OF THE SEPTUM NASI APPEARING TWICE IN A WOMAN, EACH TIME AT THE SEVENTH MONTH OF PREGNANCY.

(*b*) PAPILLARY ADENOMATOUS HYPERTROPHY OF THE MUCOUS MEMBRANE OF THE SEPTUM.

(*c*) A CYST IN THE LYMPHOID TISSUE OF THE PHARYNX.

(*d*) EFFUSION OF SERUM INTO THE NASAL MUCOSA IN CORYZA.

WITH REMARKS ON THE RELATION OF THESE LESIONS TO OTHER MORBID CONDITIONS OF THE NOSE AND THROAT.

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AN experience with such work extending over many years has long impressed me, and with an ever-increasing sense of its importance, with the great desirability that, connected with every large nose and throat clinic, a laboratory should be established in which all tissues removed from the patients should be systematically examined under the microscope. This should be done by a person thoroughly familiar with all the clinical problems presented by the histories, which in each case should accompany the specimen. Very meagre results are to be expected from the perfunctory examination of such material by a laboratory recluse. He should be in constant and thorough touch not only with all the phases of the morphological appearances of the tissue, but

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[1] Read before the Laryngological Section of the New York Academy of Medicine, March 25, 1903.